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The Role of Mobile Decoder Flashcards for Students' Learning Outcomes, Islamic Values, and Learning Motivation

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Abstract

Students, especially Muslims, are encouraged to consume halal and healthy food and *tayyib* (lawful). However, students faced a problem with how to distinguish good food. The current study aimed to investigate the benefits of using Problem-based learning (PBL) integrated with Islamic values with a decoder as learning media in increasing learning outcomes, Islamic value, and learning motivation for chemistry subjects this paper aims to examine the predictive role of mobile DECODER flash card for learning outcomes, Islamic values and learning motivation on high school students. The research was conducted on a representative sample (N = 120) of students in Pasuruan, East Java, Indonesia. Mobile Decoder Flashcards affect Islamic Values and the learning motivation of students. Students with higher Islamic Values are more interested and pay more attention during learning activities. The results of this research confirm that the Mobile DECODER Flashcard positively affects students' Islamic values and learning motivation. This study's findings show a higher score for experimental class students' Islamic values and learning motivation than the control class students' scores.

Kata kunci:
(DECODER; aplikasi mobile, hasil belajar, motivasi belajar, nilai-nilai keislaman)

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Abstrak

Siswa khususnya umat Islam dihimbau untuk mengkonsumsi makanan yang halal dan sehat serta tayyib (halal). Namun, siswa menghadapi kendala dalam membedakan makanan yang baik. Penelitian ini bertujuan untuk mengetahui manfaat penggunaan Problem Based Learning (PBL) terintegrasi nilai-nilai Islam dengan decoder sebagai media pembelajaran dalam meningkatkan hasil belajar, nilai-nilai Islami, dan motivasi belajar mata pelajaran kimia. peran prediktif mobile DECODER flash card terhadap hasil belajar, nilai-nilai keislaman dan motivasi belajar pada siswa SMA. Penelitian dilakukan pada sampel yang representatif (N = 120) siswa di Pasuruan, Jawa Timur, Indonesia. Mobile Decoder Flashcards berpengaruh terhadap Nilai-Nilai Islami dan motivasi belajar siswa. Siswa yang memiliki Nilai-Nilai Islami yang lebih tinggi lebih tertarik dan memberikan perhatian yang tinggi selama kegiatan pembelajaran. Hasil penelitian ini menegaskan bahwa Mobile DECODER Flashcard berpengaruh positif terhadap nilai-nilai keislaman dan motivasi belajar siswa. Temuan penelitian ini menunjukkan nilai nilai-nilai keislaman dan motivasi belajar siswa kelas eksperimen lebih tinggi dibandingkan nilai nilai-nilai keislaman dan motivasi belajar siswa kelas kontrol.

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INTRODUCTION

The development of science and technology in the education system appears to go in conjunction with the principles of religiosity. It is believed that the advancement and growth of science and technology do not have a possibility of taking values of faith that can stand to gain people and nations in the largest context (Abdullah, 2014). Given the normative bases of the Quran and Hadith, along with the historical foundations of Islam, improvements in the form and content of Islamic education in Indonesia, such as the integration of Islamic values in the study of science and technology, are required. Islamic educational institutions must have a view of Islam consistent with the times and a vision of modernity, the present, the future, and humanity (Yasin et al., 2023). As the embodiment of the actual, it is done by constantly making improvements and innovations in applying Islamic education. Integrating Islamic science will produce a generation of Islamic competent and trustworthy in general science, with a basis of Islamic values (Fahyuni et al., 2020).

According to Darling-Hammond, Flook, Cook-Harvey, Barron, & Osher (2020), teachers constantly seek learning techniques that will keep students accountable for their learning activities and inspire them to continue learning. Motivation is essential for students to carry out any activity. There are three factors influence student motivation throughout the learning process: relevance and personal interest from students, choice and control employed in the learning process, and students' impressions of the instructor when presenting the content. The problem-Based Learning (PBL) model is a learning model that uses contextual problems in real life and how to solve the problem. PBL model can increase motivation and learning outcomes (Velly, 2021).

On the other side, traditional computing methods are being replaced by mobile ones around the world (Iversen & Eierman, 2018). By using mobile applications in education, teachers and students can enhance instruction both inside and outside of the classroom (Luna-Nevarez & McGovern, 2018). Quantitative and qualitative study reported that mobile apps help to improve communication between teachers and students, individualize the learning process, and foster collaboration outside of the classroom (Farrah & Abu-Dawood, 2018). This suggests that instructors might use mobile applications to assist them in making the switch from conventional teaching methods to digital learning. As a result, students will become more engaged in mobile learning, which will improve participation and the educational process (Salhab & Daher, 2023). In addition, new opportunities for gadgets and mobile apps have emerged with the emergence of mobile devices like smartphones, tablets, and e-readers (Haleem et al., 2022). This demonstrates that the vast majority of tasks that were formerly completed on desktops are now invariably completed on mobile devices. Software engineers are therefore increasingly getting involved in the development of mobile apps. Gorghiu et al. (2020) also reported that students will get better understand and focused on teachers' perception focused using mobile technology in the teaching and learning process.

A decoder is a mobile learning media in the form of mobile flashcards of food additives ingredients topic. The food additives ingredients were classified based on

Islamic values, including the law of food and beverages based on Islamic law *Halal, Haram, Syubhat, Toyyib,* and *Hollis*. Decoder application integrated with Islamic values is used as learning media thus, chemical materials can be integrated (Majidah, 2015). This study research examines the predictive role of mobile decoder flashcards for learning outcomes, Islamic Values, and learning motivation in high school students.

METHODS

The quasi-experimental design of this study includes non-equivalent pre-test and post-test control groups. Learning medium is used as an independent variable, and Islamic values, beliefs, and student learning motivation are used as a dependent variable. The experiment was conducted with the control class utilizing traditional learning media and the experimental class using Mobile DECODER Flash Card learning media. The learning methods used problem-based learning (PBL). This research aims to examine the predictive role of mobile DECODER flashcards for learning outcomes, Islamic Values and learning motivation on high school students.

This study involved Senior High School Students in Madrasah Aliyah Negeri (MAN) 1 of Pasuruan City, East Java, Indonesia. Furthermore, this research used a cluster random sampling technique (Leedy, Ormrod, & Johnson, 2019), and the samples were taken from four different classes, two classes were used for the control class, and the rest was used for the experimental class. Each class consisted of 30 students. The number of samples was 120 students.

Research and development of learning instruments were carried out by producing products in the form of lesson plans, teaching materials, test instruments, and decoders which were developed and validated first before carrying out the experimental process using the PBL model. The lesson plans were made using PBL with additional materials and Islamic values for the control and experimental classes, respectively (Table 1). The decoder developed is in the form of a table containing 241 additives found in food and products circulating in the community. These substances are grouped into 13 ingredients, namely natural and artificial sweeteners, preservatives, flavor enhancers, natural and synthetic dyes, carbonation, packaging gases, developers, thickeners, flavors, antioxidants, and emulsifiers. Furthermore, they were divided into two, namely categories 1 (*halal, syubhat, haram*) and 2 (*thayib, khobais*). These categories are based on a literature review, including BMT *Halal* Status (Apriyantono, 2003), Additives (BPOM, 2019), List of Halal Products (LPPOM MUI, 2021), and Non-Critical Materials (Majelis Ulama Indonesia, 2015).

Table 1 *Experimental procedure comparison between control and experimental class*

Meeting	Control class	Experiment class
1	1) Stimulus questions without associating with verses of the Qur'an 2) Students are given examples of food ingredients and	1) Stimulus questions by linking verses of the Qur'an QS Al-Baqarah verse 168: "eat whatever is on earth which is lawful and good and do not follow the footsteps of Shaitan.

Meeting	Control class	Experiment class
	subsequently identify foods that contain additives 3) Summarizing the results of learning activities	Indeed, he is to you a clear enemy" (Figure 1.) 2) Students are given examples of food ingredients and subsequently identify foods that contain additives based on verses from the Qur'an QS Al-A'raf: "Children of Adam! Take your adornment at every time of Prayer, eat and drink without excesses. For Allah does not like those who go to excess" 3) Conclusion the results of learning activities related to Islamic values
2	1) Stimulus questions regarding additives and their impact on life 2) Students identify and discuss the content of additives in food 3) Summarizing the results of learning activities	1) Stimulus questions related to additives and their impact on life-based on the verses of the Qur'an and the determination of halal and haram 2) Students identify and discuss the content of additives in food based on the verses of the Qur'an 3) Conclusion the results of learning activities related to Islamic values

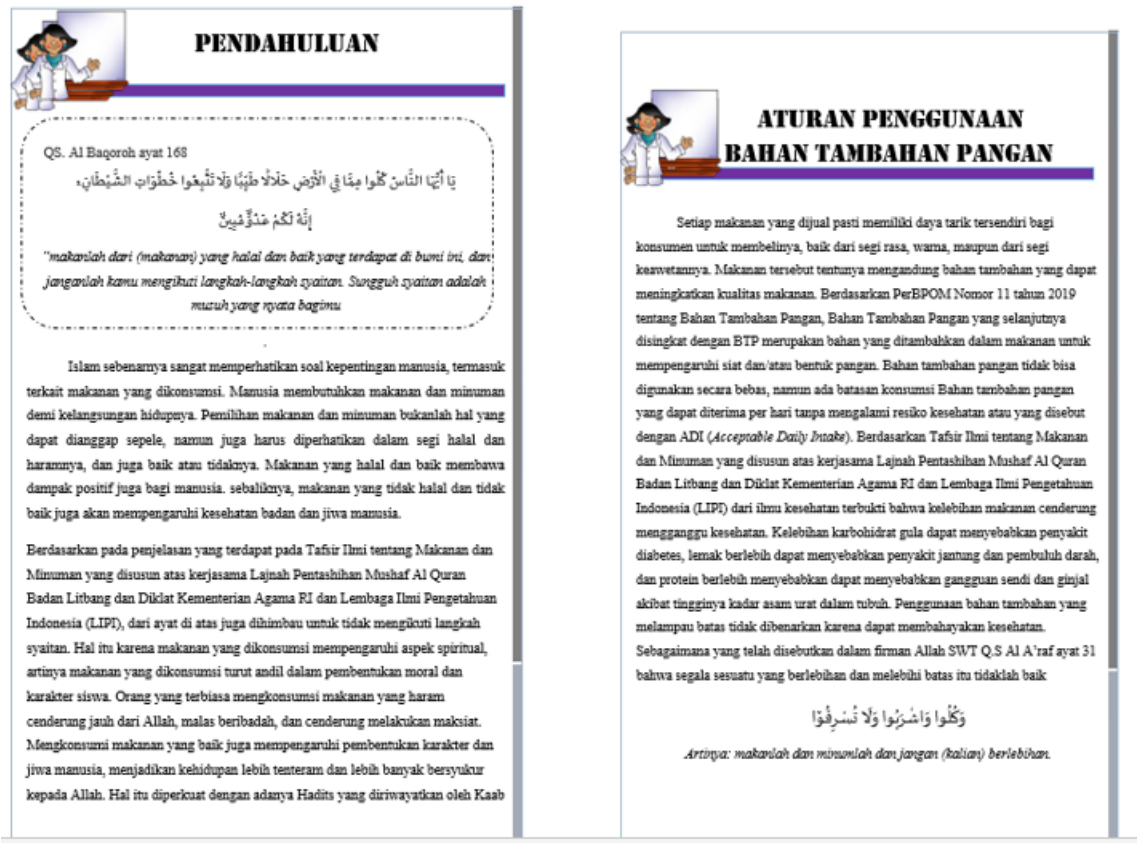

Figure 1. Islamic-integrated learning students were stimulated using QS. Al-Baqarah verse 168 to start the additives lesson and the instruction to eat something lawful and good

Students were then given problem statement related to additives substance in food (Figure 2). This problem statement could be marked as the first the of PBL model. Problem statement directed the students to make critical thinking about their food daily consumption, moreover for food with additional flavour.

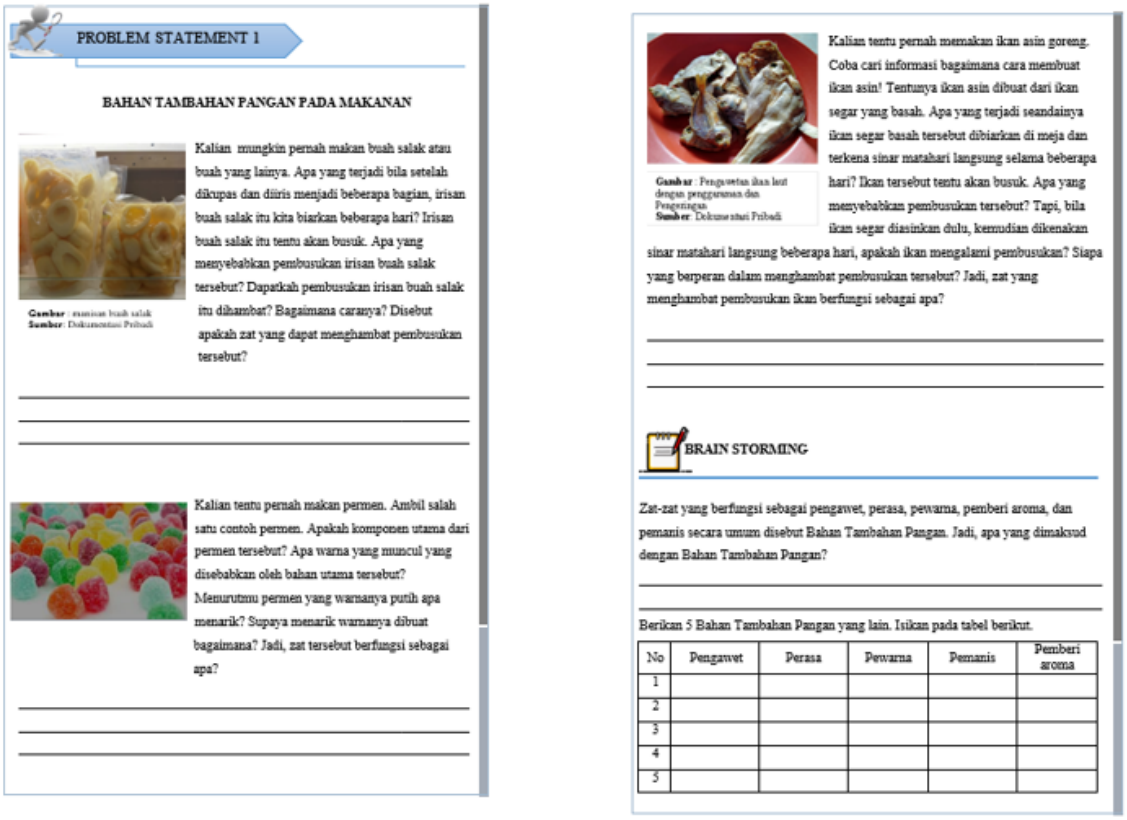

Figure 2. Problem statement

Decoder was used to help student to define and divided foods which is *Halal, Haram, Syubhat, Toyib,* and *Hollis*. Decoder menu provided some information related with the name of food, the type of food additive such as natural sweetener (*pemanis alami*, code PA) or synthetics sweetener (*pemanis buatan*, code PB) and the classification of food (Figure 3). Decoder contained with 241 additives food and products which consume by community. 1By using this card, student could identify and classified various food around them.

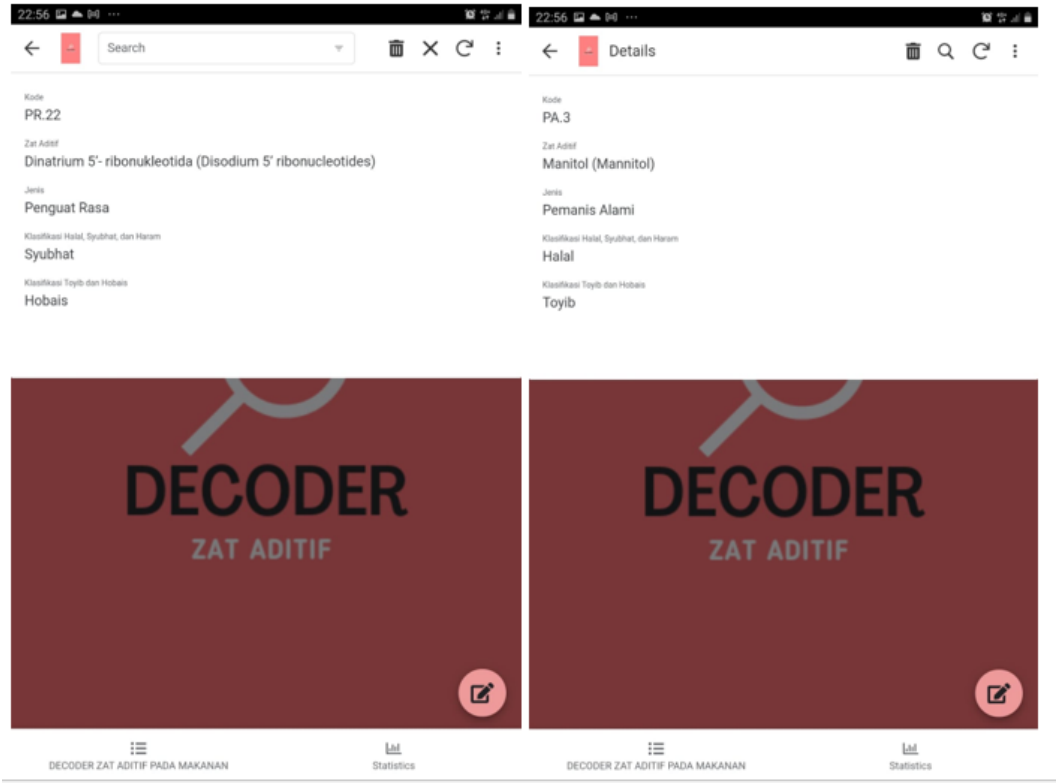

Figure 3. The decoder menu

Learning Outcomes Assessment

The learning outcomes in both classes were compared using the N-Gain score through the equation below and the category as shown at Table 2.

N gain = $\frac{\bar{x}_{post}-\bar{x}_{pre}}{10-\bar{x}_{pre}}$

Table 2.

N-Gain score category

N-Gain score	Category
g>0.7	High
0.3≤g≤0.7	Medium
g<0.3	Low

Islamic Value and Student Learning Motivation Collection Data

Data on Islamic Values principles and student learning motivation are collected using questionnaires at the beginning and conclusion of the learning process. Instruments. 1) The questionnaire on Islamic Values contained questions about gender, age, and knowledge of food and beverage law based on Islam. 2) The questionnaire on Learning Motivation (Keller, 2010).

Keller (2010) asserts that by utilizing the four ARCS (Attention, Relevance, Confidence, and Satisfaction) motivational conditions technique, a teacher needs to pay attention to four kinds of motivational circumstances to establish an exciting and relevant learning experience for students. 1) Attention: Descriptors for attention include

enjoyment in learning, curiosity, attentiveness, and punctuality in finishing assignments. 2) Relevance: Relevance with descriptors comprises topic content tailored to the learner's preferences, compatibility of learning techniques, feelings of motivation to learn, and application of the material. 3) Confidence: Confidence with descriptions includes belief in success, belief in subject matter, belief in subject matter comprehension, capacity to work hard, and self-confidence. 4) Satisfaction: Students' pleasure with accomplishments when provided material reinforcement, readiness to help peers who have not achieved, drive to strive, and contentment after attending courses.

Analysis of all types of data was carried out using IBM SPSS Statistics 24 software. The normality test of the data used the Shapiro-Wilk test ($p>0.05$), while students homogeneity used the Levene ($p>0.05$). The data on learning outcomes, Islamic value, and learning motivation in the pre-test and post-test in control and experimental classes were analyzed by ANCOVA with $P<0.05$ indicating a significant difference.

RESULT

Based on Table 3, the p-value <0.05 (0.001) indicated that the difference in learning outcomes between experimental and control students was due to the treatment in the form of integration of Islamic values in additive teaching materials taught through PBL.

Table 3. *ANCOVA analysis results*

Source	Type III Sum	df	Mean Square	F	Sig.
Corrected Model	1472.211[a]	2	736.105	7.529	.001
Intercept	31516.478	1	31516.478	322.363	.000
Pre-test	559.611	1	559.611	5.724	.020
Class	1257.694	1	1257.694	12.864	.001
Error	5572.722	117	97.767		
Total	316934.000	120			
Corrected Total	7044.933	119			

[a] R Squared = .209 (Adjusted R Squared = .181)

Table 4 informs about the percentage of increasing cognitive scores based on pre-test and post-test. At the C1 level, the increase in the percentage of students who answered correctly was 44%, while it was 31% in the control class. In C2, the percentage was 65%, and 49% in the control. Meanwhile, in C3, the percentage of the correct answer was 59%, and 52% in the control. In C4, the percentage was 68%, and 46% in the control class. These results indicated that integrated learning with Islamic values resulted in higher cognitive scores in all C1-C4 levels compared with the control class.

Table 4. *The percentage of increasing cognitive score (C1-C4) between experimental and control groups*

Cognitive (C) levels	Experiment class (%)	Control class (%)
C1	44	31
C2	65	49
C3	59	52

C4	68	46

The increase in learning outcomes of the experimental class was higher than in the control. The n-Gain value (Table 9) of the experimental class (0.68) was greater than the control (0.55). Therefore, the PBL model with Islamic value-integrated affixes has a better effect on learning outcomes.

Table 5. *N-gain score comparison results*

	N-Gain	Conclusion
Experiment class	0,68	Experiment > Control
Control class	0,55	

The Mobile DECODER Flashcard influenced students' Islamic values and learning motivation. Figure 3 shows the Mobile DECODER Flashcard bringing new learning experiences for the student. The Mobile DECODER Flashcard contains much insightful information about food ingredients, such as the food law of Islam and the function of any kind of food coloring or food flavoring.

Table 6. *Descriptive the Score of Student's Islamic Values and Learning Motivation on X (before research) and Y (after research)*

Class	N	Students Islamic Values			Students' Learning Motivation		
		X	Y	X-Y	X	Y	X-Y
Control	60	63,83	70,00	6.17	67,83	68,00	2,83
Experiment	60	65,47	96,75	31,28	71,47	89,75	18,28

Table 6 shows the descriptive analysis of the factors utilized to investigate the impact of mobile DECODER flashcards on Islamic studies and learning motivation. Based on the result experiment class (using mobile DECODER flashcard) has a higher score than the control class (conventional learning that does not use mobile DECODER flashcard).

Table 7. *The ANCOVA Analysis Technique Result of Student's Islamic Values*

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	10179,751	4	2554,938	12,914	,000
Intercept	14655,157	1	14675,156	74,364	,000
Pre-test	1059,124	1	1057,125	5,374	,024
Class	5691,578	1	5695,570	28,880	,000
Error	7220,459	55	138,281		
Total	435880,090	60			
Corrected Total	15538,601	59			

Table 7 shows The ANCOVA analysis technique was used to perform the student Islamic values hypothesis test using the results of the students' Islamic integration pre- and post-tests. Table 2 summarizes the findings of the analysis of Islamic student values have an Fcount of 28.880 with a significance level of 0.000 < 0.05.

Table 8. *The ANCOVA Analysis Technique Result of Student's Learning Motivation*

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1630,759	4	407,988	120,757	,000
Intercept	30,870	1	30,895	9,145	,004
Pre-test	1580,568	1	1580,088	468,171	,000
Class	168,652	1	168,675	49,956	,000
Error	185,681	55	3,379		
Total	274843,228	60			
Corrected Total	1816,437	59			

Table 8 shows the ANCOVA analysis technique used to test the hypothesis of students' learning motivation using the pre-test and post-test results of students' motivation to learn. The tables also summarize the findings of the student learning motivation analysis, showing an F count of 49.956 with a significance level of 0.000<0.05.

DISCUSSION

Madrasah students taught through PBL using an integrated media decoder with Islamic values in the discussion of food additives had better learning outcomes than Madrasah students who were not taught this way. In this study, the use of decoder media that is integrated with Islamic values in PBL makes it easier for students to identify chemical elements of food based on the classification of *halal, haram, syubhat, tayyib,* and *khobais* in the food being studied. It can also make it easier to memorize classifications. Even the coding on the decoder speeds up the search (investigation) and concludes the classification of substances in food.

In this study, the integration of Islamic values in science learning strengthens the affective, cognitive, and psychomotor domains. When implemented properly, it provides holistic student learning outcomes in all areas (Ramadanti, 2020). Integrated learning with Islamic values can effectively improve the cognitive abilities of Madrasah students at levels C1-C4 better than ordinary learning. The increase in the outcomes was also supported by the percentage increase in cognitive value in the pre-test and post-test. The cognitive domain contains behaviors emphasizing intellectual aspects, such as knowledge and thinking skills. In this case, students' thinking abilities are sorted according to the expected goals. The thinking process describes the stages that students should master to apply theory to action. According to Bloom's revised taxonomy, this domain consists of six levels, namely (C1) knowledge, (C2) comprehension (understanding or perception), (C3) application, (C4) analysis (decomposition or

elaboration), (C5) synthesis (integration), and (C6) evaluation (assessment) (Anderson et al., 2001).

In this study, students with integrated learning treatment had a higher activity level than the control group. This result related to integrated learning could increase interest in learning. Therefore, they no longer consider chemistry as a reaction equation only, but science that studies the regularity of God's laws in daily life. Okmarisa et al (Okmarisa et al., 2016) described chemistry learning integrated with religious values as one of the developments for a personal family (personal development) and behavior development (behavioral) learning model. The personal learning model focuses on forming and developing students' characters. The affective domain is often used in building their character. Faith and piety are attitudes embedded in every individual's heart.

Meanwhile, the behavioral cluster learning model aims to develop new desired or expected behaviors. A person's behavior is a radiance reflection of the heart/*Qolbu*, and a good heart is reflected in their character. Likewise, a dirty heart will be seen in bad behavior

The Effect of Mobile Decoder Flashcards on Student's Islamic Values

The study of science and technology should allow for the integration of Islamic principles. This approach enhances learning materials and develops by adding relevant verses from the Quran and Hadith to technology (Hariyani, 2013). It demonstrates the magnificence and power of Almighty Allah over diverse scientific and technological objects (A. Fauzi & Rohmah, 2023; S. A. Fauzi & Permadi, 2023; Muspiroh, 2016).

Additionally, this process aims to demonstrate the benefits of Islam's teachings. The use of learning tools that enable students to obtain knowledge and understanding from the Quran can be encouraged by teachers. It is more probable that prospective students will adapt eagerly and show an interest in studying if they comprehend the lessons they are learning from Islamic beliefs (Purwati et al., 2018). Islamic values education provides several opportunities to develop a student's character in line with Islam. The process of human formation is what Islam seeks, and this is the heart of Islamic values. According to the aforementioned viewpoint, Islamic education aims to educate and mentor students, in this case, to help them comprehend and respect Islam's teachings and help them grow in their faith and devotion to Allah (Zakariyah et al., 2022). You may live a life of exaltation as a Muslim and develop into a person who is loyal to the point of death in a Muslim nation.

The mobile DECODER Flashcard makes it simple for students to comprehend Islamic dietary regulations. Students can readily adopt Islamic dietary regulations through these exercises. Learning techniques like incorporating Islamic principles into lessons can be used to improve learning outcomes. Integrating Islamic values into science and technology learning allows students to integrate science and technology with Muslim concepts and real-life experiences, making literature essential. Islamic content (the Quran and Hadith, Aqida and Akhak, and Fiqih) can be integrated into

educational materials using scientific and technical content (Hakim, 2012). In order to accomplish this purpose, educators must be able to use the appropriate teaching methods. The right methods are used to assist teachers in conveying and incorporating Islamic values into their teaching materials. In addition to teaching strategies, a teacher's understanding of Islam is crucial for incorporating Islamic principles into the course materials. Islamic values cannot be incorporated into learning materials by teachers who lack sufficient Islamic knowledge (Badawi, 2024; Hashim & Ssekamanya, 2014; Usman et al., 2024). Teachers' ability to incorporate Islamic ideals into lesson plans can be improved with proper Islamic understanding. Teachers can positively impact instruction and learning by combining robust teaching resources with assuring intellectual and academic proficiency (Tong et al., 2022). Knowledge of teachers in their professions, mainly Islamic religious education, facilitates improvements in teaching and learning.

The findings of this study look at how Islamic principles are incorporated into secular curricula for science and technology education. Education should strengthen the virtues of dedication and faith (Arianto et al., 2024; Hariyani, 2013; Savika et al., 2024). Integrating Islamic values into relevant parts of science and technology learning is an attempt to develop a Muslim personality among students, especially the student's Islamic values.

The Effect of Mobile Decoder Flashcards on Student's Learning Motivation

The Mobile DECODER Flashcards showed has significant impact on student motivation. This efficiently incorporates students' technical backgrounds into class activities and is very beneficial for generating genuine revenue. Responsive to student needs and interests, integrating technology into the learning process. One perspective on education is the acquisition of sustainable learning approaches suitable to playing an effective role in this setting and sustainably storing information. On both fronts, the effectiveness of learning with technology was observed. There is evidence that the use of technology can improve student performance and self-efficacy (Liu et al., 2009). While this may be the case, certain research has indicated that using technology in certain subjects does not benefit students. Technology integration must produce positive results (Cramer & Smith, 2002). Several studies observed enhanced student engagement and motivation when they were permitted to construct authentic learning experiences using digital resources (Chao et al., 2016; Nkomo et al., 2021).

Motivate students by stimulating their curiosity in the teaching and learning process. Keller (2010) explained that the aspect of motivation, attention, occurs because it is triggered by interest that needs to be stimulated. This curiosity can be stimulated by elements that are different from existing ones (Alazeez et al., 2024; Apriliani et al., 2024; Fidayani & Ammar, 2023). For example, the use of technology, integrated media, and additional information that engages students by studying their surroundings. During the learning process, ongoing student discussion activities related to using information obtained in everyday life. One of them is additional information on Muslim eating and

drinking laws. Harackiewicz et al. (2016) describe strategies for capturing students' attention in teaching and learning: awakening students' perceptive powers, fostering their curiosity, and using various teaching and learning elements. Keller (2010) showed that motivation is maintained when students believe that what they are learning benefits them. The interest and variety of presentation models of information gleaned from students during the teaching and learning process can increase student motivation (Abdulrahaman et al., 2020; Adimsyah et al., 2023; Qomariyah et al., 2023). According to Harackiewicz et al. (2016), one of the reasons he improves the motivational aspect of students is because they feel more satisfied when they become more informed in the teaching and learning process. For more information, this situation is one of the most representative because students need information received during the teaching and learning process. So by this study, students can increase their learning motivation and Islamic values only through learning media.

The variability in student motivation to learn cannot be separated from each student's intrinsic motivation and can affect the ultimate motivation of students during the teaching and learning process. Schunk & Zimmerman (2012) stated that motivation as a process tends to fluctuate and is not fixed. Intuitively, teachers aim to put students in a motivating state that supports teaching and learning. They seek to use specific teaching and learning strategies to draw students' attention to their challenges. Teaching and learning strategies can curb other aspects influencing students' learning motivation. In the future, educational studies need more research on student learning motivation to ensure learning media or strategy effectiveness.

CONCLUSION

This research confirms that the Mobile DECODER Flashcard positively affects students' learning outcomes, Islamic values, and learning motivation. The study's findings show that experimental class students scored higher in Islamic values and learning motivation than control class students in MAN 1 Pasuruan. The study suggests that to ensure the effectiveness of Mobile DECODER Flashcards, more relevant studies are needed in the future. These studies should involve larger samples, explore a variety of topics, and provide adequate information on the benefits of DECODER Flashcards integrated with Islamic values.

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